

REMARKS

Claims 1-43, 45, 47-48, and 51-58 were presented for examination and were pending in this application. In an Office action dated January 10, 2005, claims 1-43, 45, 47-48, and 51-58 were rejected. Applicants address Examiner's comments below.

Applicants first note that Examiner has considered the references submitted in the Information Disclosure Statements filed on June 27, 2002, and March 13, 2003. Subsequently, Applicants filed Supplemental Information Disclosure Statements on June 19, 2003 and October 27, 2004. However, Examiner still has not acknowledged consideration of these Supplemental disclosures. Applicants kindly request written confirmation to indicate that the references cited in the Supplemental Information Disclosure Statement filed on June 19, 2003 and October 27, 2004 have been considered. Applicants once again are providing a copy of these IDS submissions with the corresponding receipt postcard as proof of prior submission. Applicants also note that an Information Disclosure Statement was submitted on March 14, 2005, which also will need to be considered by Examiner.

Applicants cancel claims 18-24 and 54-56 without prejudice. Applicants herein amend claims 1, 25, 27, 32, 40, and 57. These changes are believed not to introduce new matter, and their entry is respectfully requested. The claims have been amended to expedite the prosecution of the application in a manner consistent with the Patent Office Business Goals, 65 Fed. Reg. 54603 (Sept. 8, 2000). In making these amendments, Applicants have not and do not concede that the subject matter of such claims was in fact disclosed or taught by the cited prior art. Rather, Applicants reserve the right to pursue such protection at a later point in time and merely seeks to pursue protection for the subject matter presented in this submission.

Based on the above Amendment and the following Remarks, Applicants respectfully request that Examiner reconsider all outstanding objections and rejections, and withdraw them.

Response to Claim Rejection Under 35 USC §§ 102(e) and 103(a) in View of Adan

In the 1st and 2nd paragraphs of the Office action Examiner rejects claims 18-24, 40-43, 47-48, 51 and 54-57 under 35 USC § 102(e) as allegedly being anticipated by U.S. Patent No. 6,531,692 to Adan et al. ("Adan"). The Examiner also rejects claims 1-2, 4-7, 9-15, 25-37, 45-48, and 58 under 35 USC § 103(a) as rendered obvious by Adan. These rejections are now traversed.

Claims 18-24 and 54-56 are cancelled. Representative claim 1 recites a system for illuminating a target surface comprising:

a light source, positioned at a first angle relative to a circuit board, the light source configured for emitting light to illuminate the target surface; and

a lens having an entrance surface and an exit surface, the entrance surface positioned to gather the light from the light source and the exit surface directing the light onto the target surface, wherein the entrance surface and the exit surface are positioned at a second angle relative to each other, the second angle dimensioned to fold a light beam from a first direction associated with the angle of the light source relative to the circuit board to a second direction associated with an impinging angle for illuminating the target surface, wherein the first direction is different from the second direction.

Similar claim features relating to light source angles and light beam folding or refraction are included in the following independent claims. For example, claim 25 recites a method for illuminating a surface using an illumination system in a computer pointing device, comprising:

emitting light at a first angle relative to the surface;
gathering the light; and

directing the light from the pointing device at a second angle onto the surface using a refractive lens, wherein the first angle is different than the second angle.

In addition, claim 27 recites an illumination system in a computer pointing device for illuminating a surface, the system comprising:

a light emitting means for emitting light, the light emitting means tilted at a first angle relative to the surface;

a gathering means for gathering the light from the light source; and

a directing means for directing the light at a second angle onto the surface, wherein the first angle is different than the second angle.

Similarly, claim 32 recites a refractive lens comprising:

a first curved surface, positioned to gather light; and

a second curved surface, coupled to the first surface, shaped for directing the light in an optical illumination system to a target surface, wherein the first surface and the second surface are positioned at an angle relative to each other, the angle dimensioned to fold a light beam from a first direction associated with a light source to a second direction associated with an impinging angle for illuminating the target surface using refraction, wherein the first angle is different than the second angle.

Claim 40 also recites an illumination system, however the system of claim 40 uses total internal reflection and comprises:

an entrance surface, positioned to gather light from a light source positioned at a first angle with respect to a target surface;

a truncated light pipe, coupled to the entrance surface, for directing the light gathered at the first angle by reflecting at a second angle off a first reflective surface meeting a total internal reflection condition, wherein the first angle is different than the second angle; and

a curved exit surface, coupled to the truncated light pipe, for efficiently directing the light onto the target surface.

Additionally, claim 57 also recites an illumination system, which is for use in a displacement detection computer pointing device and comprises:

a circuit board;

a light emitting diode at a first angle relative to the circuit board; and

a lens aligned with the light emitting diode for focusing the light at a second angle onto a surface, wherein the first angle is different from the second angle, the lens comprising an aspherical entrance surface and a cylindrical exit surface.

As recited in claims 1, 25, 27, 32, 40, and 57 a light source (e.g., a light emitting diode) is positioned at a first angle with respect to a surface or circuit board and a lens is used to fold, refract, direct, or focus the light at a second angle to a surface that is different than the first angle. The claimed angled light source interfaced with a beam-folding lens, such as for example, a refractive lens or a truncated light pipe. The beam folding or redirection is accomplished, for example, by positioning the entry and exit surfaces of the illumination lens at an angle with respect to each other, such as in a wedge-shape, truncating plane, or similar configuration. These features of the claimed invention increase manufacturing flexibility, allow for optical system size reduction, and reduce costs due to fewer parts and material used in manufacturing, while maintaining or enhancing illumination spot brightness.

In contrast to the claimed invention, Adan simply shows an illumination system with a source 104 and a coupler 107 in which “it is important that optical coupler 107 and source 104 be well aligned with one another.” (Adan, 11:54-55 (emphasis added); see also, Adan, 11:61-63 (reemphasizing that “not only is it important that optical coupler 107 and source 104 be appropriately axially aligned with one another...”). As shown in several of the Figures in Adan, for example in Figure 6, the coupler’s entrance 142 and exit 144 surfaces share the same optical axis, aligned with the axis of the LED 104. Thus, the entrance and exit surfaces are not positioned at a different second angle relative to each other. Moreover, as described in Adan, any suggested angle between these two surfaces cannot be dimensioned to fold a light beam from a first direction associated with the angle of the light source relative to the circuit board to a different second direction associated with an

impinging angle for illuminating the target surface because the source and coupler in Adan must be axially aligned.

Further, due to this alignment requirement in Adan, the light beam from LED 104 is not “folded” or “refracted” to a different direction associated with an impinging angle for illuminating the target surface as recited in the claims of the present invention. For example, as shown in FIG. 5, the internal refractions of the beam in the coupler are not in the direction associated with the impinging angle for illuminating the target surface (i.e., the angle between double arrows out of exit surface 144 and surface 106).

Moreover, the optical coupler 107 in Adan is described as having “sufficient length to remove the radiation source 104 from aperture 106 by an amount which reduces the likelihood that electrostatic discharge will reach any exposed leads or wires within housing 102.” (Adan, 11:40-45). Thus, Adan teaches the use of a longer “central portion” to reduce the likelihood of electrostatic discharge (“ESD”), which directly contradicts the design advantages of smaller optical components provided by the present invention. As noted above, these design advantages are provided by the claimed elements providing different first and second angles between illumination system components, thus allowing much more flexibility of component placement than the axially aligned system shown in Adan. There is no indication in Adan of using any optic features, such as for example a wedge-shaped body, a truncated surface, or the like, to reduce the size of the illumination lens because Adan finds the longer illumination lens aligned with the source to be advantageous from an ESD protection perspective.

Further, Applicants note that the shape of the lens 155 in Adan fails to anticipate these claims, despite Examiner’s allegation that it reads on the limitations of claims 2 and 4.

As the Examiner agrees, lens 155 in Adan is not an illumination lens. Accordingly, it is not “positioned to gather light from the light source” or for “directing light onto the target surface.” Rather, lens 155 is an imaging lens through which light is reflected upwardly to impinge upon image detector 110 (Adan, 12:24-27). Thus, neither its shape nor its description or function read on the “refraction” (e.g., folding, directing, or focusing at a second angle) limitation recited in the claims. Therefore, although the claims do not explicitly recite “illumination” lens, Adan, by its description of the lens 155 relied upon as the basis for this rejection, fails to meet all the recited limitations, e.g., it does not teach or disclose being “positioned to gather light from the light source” or “directing onto the target surface.” Hence this rejection is improper.

Accordingly, Adam fails teach or suggest any “refractive lens,” “truncated light pipe,” “directing light at a [different] second angle,” or “fold[ing] a light beam from a first direction associated with the angle of the light source relative to the circuit board to a second [different] direction associated with an impinging angle” as recited in the claims. Therefore, it is respectfully submitted that these rejections are improper and should be withdrawn.

Thus, based on the above Amendments and Remarks, Applicants respectfully submit that for at least these reasons independent claims 1, 25, 27, 32, 40, and 57 are patentably distinguishable over the cited reference. In addition, as claims 2-17, 26, 28-31, 33-37, 41-43, 47, and 51 are dependent on the above independent claims, all arguments advanced above with respect to claims 1, 25, 27, 32, 40, and 57 are hereby incorporated so as to apply to their dependent claims. Therefore, Applicants respectfully submit that claims 1-17, 25-37, 40-43, 47, 51, and 57 are patentably distinguishable over the cited reference and respectfully request that Examiner reconsider the rejection, and withdraw it.

With respect to claims 45 and 48, these claims recite a reflective surface having “a metal coating.” Claims 45 and 48 are dependent from claim 40 and all arguments advanced above with respect to claim 40 are hereby incorporated so as to apply to claims 45 and 48. Thus, Adan fails to anticipate the features described above with respect to claim 40. Further, as Examiner states in the Office Action, Adan fails to describe “the citation of having the first and the second reflective surfaces have a metal coating.”

Adan shows the light from the LED 104 reflected from the surface 107 in Fig. 5. However, this does not indicate a surface with a high reflectivity (i.e., metal surface) as indicated in the Office action. An equally likely assumption is that the angle of incidence is above the threshold angle for total internal reflection, which depends on the refractive index variation between the two interfacing media, e.g., glass and air, and is not necessarily related to the reflective characteristics of the surface. Thus, one of ordinary skill in the art would not have been motivated to make the reflective surface of metal simply because some reflection is shown in Figure 5.

Therefore, for at least the above reasons, Applicants respectfully submit that claims 45 and 48 are patentably distinguishable over the cited reference and respectfully request that Examiner reconsider the rejection, and withdraw it.

Response to Claim Rejection Under 35 USC § 103(a) in View of Adan and Smith

In the 5th paragraph of the Office action, Examiner rejects claims 3 and 8 under 35 USC § 103(a) as allegedly being unpatentable in view of Adan and U.S. Patent No. 6,476,970 to Smith (“Smith”). This rejection is respectfully traversed.

Claims 3 and 8 are dependent from claim 1, thus, all arguments advanced above with respect to claim 1 are hereby incorporated so as to apply to claims 3 and 8. Hence, with

respect to claims 3 and 8, Adan fails to anticipate the features described above with respect to claim 1. Further, claim 3 recites a system “wherein the lens directs the light onto the target surface using a Fresnel lens.” Similarly, claim 8 recites a system “wherein the lens is wedge-shaped.” Adan teaches a system having an illumination lens (optical coupler 107) and a light source (LED 104) that are mounted as follows:

... ramp 152 that includes a generally inclined tunnel for receiving the outlet end 144 of optical coupler 107. Support housing 154 ... receives LED 104. Housing 154 includes locator posts ... that are disposed within corresponding apertures in a circuit board 158. ... [H]ousing 154 is disposed at an angle relative to work surface 116 which is generally similar to that at which optical coupler 107 is disposed.

(Adan, 12:7-20). However, Adan fails to disclose the use of a system “wherein the lens directs the light onto the target surface using a Fresnel lens” or “wherein the lens is wedge-shaped.” Examiner cites Smith for its disclosure of the use of a Fresnel lens and wedge shapes in an illumination lens. Smith teaches using a Fresnel lens as a collimating surface for the entry surface of the illumination lens (Smith, 4:30-33). However, Smith teaches away from the use of its lens designs with a “tapered light pipe” system, such as the system shown in Adan, which requires a special housing. According to Smith:

this approach offers a design very little control over the routing and angular distribution of the resulting light. The approach also has the following additional disadvantages. First, since the light pipe needs to be at an angle relative to the surface to be illuminated, both the light source and light pipe require special mounting to meet these angle requirements, thereby increasing the manufacturing costs. Second, the light travels through the light pipe, the angle of the light beams increases every time the light beam is reflected off of one of the walls of the light pipe. Consequently, the output light beam has a high degree of divergence that results in a high angle of incidence with the surface of illumination. This high angle of incidence may cause certain contrasts resulting from certain types of surfaces to be washed out

or negated by the illumination beams, thereby leading to poor performance of the optical mice on certain surfaces.

(Smith, 1:66-2:15).

Therefore, the tapered light pipe with special housing of Adan is inconsistent with the simplified lens system of Smith and would lead one of ordinary skill in a direction divergent from the claimed invention. Accordingly, Smith teaches away from the claimed invention and cannot be properly used as a reference rejecting the present claims since by teaching away it does not provide any teaching or suggestion to combine. In re Gurley, 31 USPQ 1130, 31 (Fed. Cir. 1994). *See also*, In re Fine, 5 USPQ2d 1596, 1598-99 (Fed. Cir. 1988). “[E]lements of separate prior patents cannot be combined when there is no suggestion of such combination anywhere in those patents...; and a court should avoid hindsight Likewise, the teaching of [the cited references] are inconsistent with the claimed invention” (emphasis added; annotations within square brackets). Panduit Corp. v. Dennison Mfg. Co., 1 USPQ2d 1593, 1597 (Fed. Cir. 1987), citing ACS Hospital Systems, Inc. v. Montefiore Hospital, 220 USPQ 929, 933 (Fed. Cir. 1984).

For all of the above reasons, Applicants respectfully assert that claims 3 and 8 are patentable over Adan and/or Smith, and that the combination is improper in any case, and therefore, respectfully request that Examiner reconsider and withdraw the rejection.

Response to Claim Rejection Under 35 USC § 103(a) in View of Adan and Bidiville

In the 6th paragraph of the Office action, Examiner rejects claims 16-17, 23-24, 38-39 and 52-53 under 35 USC § 103(a) as allegedly being unpatentable in view of Adan and U.S. Patent No. 6,084,574 to Bidiville (“Bidiville”). This rejection is respectfully traversed.

Claims 23-24 are cancelled without prejudice, thus obviating the basis for this rejection at this time. Claims 16-17 depend from claim 1, claims 38 and 39 depend from claim 32, and claims 52 and 53 depend from claim 40. As such, all the arguments advanced above with respect to Adan as set forth for claims 1, 32, and 40 are hereby incorporated so as to apply to claims 16-17, 38-39 and 52-53. Hence, with respect to claims 16-17, 38-39 and 52-53, Adan fails to anticipate the features described above with respect to claims 1, 32, and 40, which Bidiville would not rectify. Moreover, Bidiville does not address these. Thus, neither Alan nor Bidiville, alone or in combination, anticipate all the elements of claims 16-17, 38-39 and 52-53.

For all of the above reasons, Applicants respectfully assert that claims 16-17, 38-39 and 52-53 are patentable over Adan and/or Bidiville, and therefore respectfully request that Examiner reconsider and withdraw the rejection.

Conclusion

In sum, Applicants respectfully submit that claims 1-17, 25-43, 45, 47, 48, 51-53 and 57-58 as presented herein, are patentably distinguishable over the cited references (including references cited, but not applied). Therefore, Applicants request reconsideration of the basis for the rejections to these claims and request allowance of them.

In addition, Applicants respectfully invite Examiner to contact Applicants' representative at the number provided below if Examiner believes it will help expedite furtherance of this application.

Respectfully Submitted,
Olivier Theytaz, Francis Pilloud and
Pascal Eichenberger

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By: Rajiv Patel

Rajiv P. Patel, Attorney of Record
Registration No. 39,327
FENWICK & WEST LLP
801 California Street
Mountain View, CA 94041
Phone: (650) 335-7607
Fax: (650) 938-5200